ABSTRACT OF THE DISCLOSURE

The ternary alloy $CdSe_xTe_{1-x}$(2 1 1) and the quaternary alloy $Cd_{1-z}Zn_zSe_xTe_{1-x}$ have been grown on Si(2 1 1) substrates using molecular beam epitaxy (MBE). The growth of CdSeTe is facilitated using a compound CdTe effusion source and a Se effusion source while the growth of CdZnSeTe is facilitated using a compound CdTe effusion source, a compound ZnTe effusion source, and an elemental Se source. The alloy compositions (x) and (z) of $CdSe_xTe_{1-x}$ ternary compound and $Cd_{1-z}Zn_zSe_xTe_{1-x}$ are controlled through the Se/CdTe and ZnTe/CdTe flux ratios. The rate of Se incorporation is higher than the rate of Te incorporation as growth temperature increases. As-grown CdSeTe with 4% Se and CdZnSeTe with 4% Zn + Se, which is substantially lattice matched to long-wavelength infrared HgCdTe materials, exhibits excellent surface morphology, low surface defect density (less than 500 cm^{-2}), and a narrow X-ray rocking curve (a full-width at half maximum of 103 arcsec).